CMFRI Special Publication No. 83 ISSN : 0972-2351

# MANGROVE ECOSYSTEMS

## A MANUAL FOR THE ASSESSMENT OF BIODIVERSITY

A follow up of the
National Agricultural Technology Project
(NATP.), ICAR.

*Mangrove Ecosystem Biodiversity :*
*Its Influence on the Natural Recruitment of*
*Selected Commercially Important Finfish and Shellfish*
*Species in Fisheries*

*Edited by :*
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भाकृअनुप
ICAR

Central Marine Fisheries Research Institute
*(Indian Council of Agricultural Research)*
P.B. No. 1603, Ernakulam North P.O; Cochin – 682 018, Kerala, India

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## A Manual for the Assessment of Biodiversity

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**ISSN : 0972-2351**

**CMFRI Special Publication No. 83**

*Edited by :*
**Dr. George J. Parayannilam**

*Editorial assistance :*
**Mr. P. K. Jayasurya**
**Dr. Ansy Mathew**

*Cover design :*
**Sreejith K. L.**



Price :
Indian Rs. 600/-
Foreign $ 60/-

*Printed at :*
**Niseema Printers & Publishers, Cochin - 18. Kerala, India. Ph : 0484-2403760**

# Determination of Net Gain / Loss of Oxygen by Biochemical Processes in Tropical Waters

**G.S.D. Selvaraj**

**Introduction :**

Biochemical role involving photosynthesis, respiration and other oxidation-reduction processes such as decomposition of organic matter and recycling of minerals by bacterial action influence the rate of production and consumption of dissolved oxygen in tropical aquatic ecosystems. In the existing method of BOD and COD estimations , the biochemical release of oxygen in water by photosynthesis and consumption by respiration of phyto and zooplankton are not considered while assessing the biochemical oxygen demand in aquatic systems. This method helps to assess the net loss/gain of biochemical oxygen consumption / production in the water samples considering the microbio-chemical processes involving release of oxygen by photosynthesis, consumption by respiration of micro-organisms and other biochemical oxidation – reduction processes in water.

**Principle:**

This modified L & D bottle oxygen technique, with 3 - 4 hours of incubation of Light and Dark bottles, helps to assess the net rate of biochemical consumption / production of oxygen assuming that L-I per 12 hrs (extrapolated value) gives the net rate of production / consumption of oxygen during 12 light hrs and D-I per 12 hrs would give the values for the 12 dark (night) hrs of the day.

**Procedure :**

Collect water samples in 'I', 'D' and 'L' bottles (BOD glass bottles) in duplicate . Fix the ' I' bottle samples with Winkler ' A' and 'B' and give incubation of 3-4 hours to 'L' and 'D' bottles . Note the initial and final time of simulated *in situ* experiment . Estimate oxygen for 'I', 'D'and 'L' bottle samples. Extrapolate L-I value for 12 hours and D-I value for 12 hours. The difference in the oxygen values obtained between 'L' and 'I' bottles (L-I) for 12 light hours was considered for the net result of biochemical oxygen production by phytoplankton and bacteria together (+value) or consumption (- Value) for the day time. The 'D' and 'I' bottles (D-I) per 12 hours to indicate the net result of biochemical oxygen production (+ value) or consumption (- value) during night time. Commutation of these oxygen values (plus and minus values) thus obtained for the day and night hours [(L-I) +(D-I)] would give the net rate of biochemical production (+ value = net gain) or consumption (- value = net loss) of oxygen in the water samples per day (24 hours). If the net gain/loss of oxygen values are expressed per hour , the values may be given upto four decimal points ( for more accuracy).

**Note :**

1. Using the data of this experiment, gross and net primary production can also be estimated adopting the formula (L-D) per 12 hours and 0.8 (L-D) per 12 hours respectively. The respiration by photosynthetic organisms would be 0.2 (L-D) for 12 light hours and 0.4 (L-D) for 24 hours of the day. As a result, net photosynthetic production of oxygen for 24 hours of the day would be 0.6 (L-D) per 12 hours.

2. This method helps to assess the water quality indicating whether and to what extent the aquatic environment is in the oxidizing or reducing state.

**Suggested References**

Selvaraj, G.S.D. (1997). *Proceedings of the National Seminar on Water Quality Issues in Aquaculture Systems.* p.139-146. Fisheries College, Tuticorin.

Selvaraj, G.S.D. (2000). *Seaweed Res.Utiln.,* **22***(1&2):* 81-88.

Selvaraj, G.S.D. (2002). *Proc. Natl. Sem. Devt. Tran. Fish. Tech.*, p.59-65. Fisheries College, Tuticorin.